Crosswalk Directions:

2007 MLR to 1997 MLR

1.   Use a Y (yes), an N (no), or a P (partially) to indicate the extent to which the standard, performance indicator, or descriptor of the 2007 MLR can be found in the 1997 MLR. If you indicate that the standard or performance indicator is partially found, please explain in the cell of the spreadsheet. If you answer "no", please respond only to questions 6, 8, and 9.

2.   Use a Y (yes), an N (no), or a P (partially) to indicate the extent to which the concept/idea of the 2007 MLR standard, performance indicator, or descriptor can be found in the 1997 MLR. If you indicate that the idea/concept is partially found, please explain in the cell of the spreadsheet.

3.   Use a Y (yes), an N (no), or a P (partially) to indicate the extent to which whether the wording of the 2007 MLR standard, performance indicator, or descriptor can be found in the 1997 MLR. If you indicate that the wording is partially found, please explain in the cell of the spreadsheet.

4.   Indicate where the standard, performance indicator, or descriptor of the 2007 MLR can be found in the standards or performance indicators of the 1997 MLR. For example, one might indicate A (standard A), A1 (standard A, performance indicator 1), or A1, 2 (standard A, performance indicators1 and 2).

5.   Indicate with a Y (yes) or an N (no) whether the performance indicator of the 2007 MLR can be found at the same grade span in the 1997 MLR. If "no", indicate the grade span where the performance indicator is found in the 1997 MLR. As an example, a performance indicator found in 6-8 in the 2007 should be considered to be at a different grade span if it is found at 5-8 in the 1997 MLR.

6.   Indicate with a 1, 2, 3, 4, 5 or 6 the level of Bloom's Taxonomy that best represents the cognitive demand of the 2007 MLR.   Where more than one level of cognitive demand is indicated please use more that one designation. Please use the attached copy of Bloom to guide your decision about the cognitive demand.

7.   Indicate with a 1, 2, 3, 4, 5 or 6 the level of Bloom's Taxonomy that best represents the cognitive demand of the 1997 MLR.   Where more than one level of cognitive demand is indicated please use more that one designation. Please use the attached copy of Bloom to guide your decision about the cognitive demand.

Science and Technology CROSSWALK: 2007 MLR to 1997 MLR		CONTINUITY						
	Is it in the 1997 standards?	Is the CONCEPT /IDEA the same?	Is the WORDING the same?	WHERE is it found? (Standard, PI)	Is it at the same grade span or grade level?	At what level of Bloom's taxonomy is the COGNITIVE DEMAND in the 1997 MLR?	At what level of Bloom's taxonomy is the COGNITIVE DEMAND in the 2007 MLR?	
A. UNIFYING THEMES - Students apply the principles of systems, models, constancy and change, and scale in science and technology.	Not as a separate standard although the word system is mentioned explicitly in standards A, B, C and alluded in many others. The word models appears only in standard J. The word change appears in standard B, D, E, and F and is implied in standards H, I, and M. The word constancy does not appear but the idea is implied in M. The word scale does not appear in any of the standards.	P	N	Throughout	N/A	N/A	N/A	
A1 SYSTEMS								
PK-2 PERFORMANCE INDICATOR								
Students recognize that parts work together, and make up whole human-made and natural objects.	Y	P - No focus on how the parts work together in the 1997.	P	A4-PK2, C1-PK2, C2-PK2, E1-PK-2, F2-PK2,	Y	3, 5 and some levels unclear	2	

a. Explain that most human-made and natural objects are made of parts that when put together, can do things they could not do separately.	P-Students are asked to describe specific parts of systems and describe interactions in systems.		N	N	A4-PK2, C1-Pk2, C2-PK2, E1-PK-2, F2-PK2,	Y	3, 5 and some levels unclear	2
3-5 PERFORMANCE INDICATOR								
Students explain interactions between parts that make up a whole human-made and natural thing.	Y- The idea of the kind of interaction is open to interpretation in 1997 MLR	P- the type of interaction is more open to interpretation in the 1997 MLR	N		A1-3/4, B1-3/4, C2 -3/4,	Y	2, 3	2
parts of organisms, ecosystems or human-	interaction is open to interpretation	N	N		C2 -3/4,	Y	2,3	1
b. Explain that things including organism, ecosystems or human-made structures may not work as well, or at all, if a part is missing broken, worn out, mismatched or misconnected.	Y- The idea of the kind of interaction is open to interpretation in 1997 MLR		N	N	A1-3/4, B1-3/4, C2 -3/4,	Y	2, 3	2
6-8 PERFORMANCE INDICATOR								
Students describe principles of systems in human-made and natural things and processes.	P- The 1997 standards explicitly identifies systems as aspects of standard A, B, C, and M (living things). Although performance indicators in other standards describe parts of systems in their performance indicators there is no explicit identification that the idea is connected to a system (D, E, F, G and H, I)	Y	P		A1-5/8, A2-5/8, B1-5/8, B2-5/8, B4-5/8, C1-5/8, C4-5/8, C5-5/8, M4-5/8	Y	1, 2, 3, 4, 5	2
a. Explain how individual parts working together can do more than each part individually in such systems as an organism, Earth systems, solar system or human-made structures.	P- This idea is not explicitly stated but may be the result of learning depending upon the teacher's interpretation of the performance indicators in the 1997 MLR	N	N		B2-5/8,C1-5/8, C4-5/8, C5-5/8, M4-5/8	Y	1, 2, 4	2
b. Explain how the output of one part of the system, including waste products from manufacturing or organisms, can become the input of another part of a system.	P- same as above	N	N		B1-5/8, B4-5/8, C1-5/8, C4-5/8, C5-5/8, M4-5/8	Y	1, 2, 4	2
c. Explain that systems are nested and one system may be thought of as containing subsystems as well as being a subsystem of a larger system.	P-same as above	N	N		A1-6/8, A2-6/8, M4-6/8	Y	3, 5	2

9 - Diploma PERFORMANCE INDICATOR							
Students apply an understanding of systems to explain and analyze human-made and natural phenomena.	P- The 1997 standards explicitly identifies systems as aspects of standard A, B, C, and M (living things). Although performance indicators in other standards describe parts of systems in their performance indicators there is no explicit identification that the idea is connected to a system (D, E, F, G and H, I). Even in A,B, C at this level there is less direct mention of systems.			A2-5/8, B1-9/D, B2-9/D, B3-9/D, B4-9/D, C2-9/D, C4-9/D, F1-9/D, F2-9/D, F3-9/D, H6-9/D, I4-9/D, I5-9/D, M2-9/D		2,4	2, 4
a. Analyze a system using principles including boundaries, subsystems, inputs, outputs, feedback, or the system's relation to other systems, to explain phenomena, and design solutions to a problem.	P-No focus on designing solutions to a problems	P- This idea is not explicitly stated but may be the result of learning depending upon the teacher's interpretation of the performance indicators in the 1997 MLR	N	A2-5/8, B1-9/D, B2-9/D, B3-9/D, B4-9/D, C2-9/D, C4-9/D, F1-9/D, F2-9/D, F3-9/D, H6-9/D, I4-9/D, I5-9/D, M2-9/D	Y	2, 4	2,4
b. Explain how it may not always be possible to predict the impact of changing some part of a human-made or natural system.	N						
A2 Models							
PK-2 PERFORMANCE INDICATOR							
Students identify models and the use the models to learn about the features of the objects they represent.	P- There is no explicit understanding in 1997MLR that students are using/making models and that models are not entirely like the real thing.	P	N	A3-PK/2, D3-PK/2, G2-PK/2, I1-Pk/2, I2-PK/2, L6-PK/2,	Y	2, 3	1, 3
a. Describe ways in which toys and pictures are like the real things they model.	N						

b. Use a model as a tool to describe something about the motion of objects or the features of plants and animals.		Y	Y	Y	A3-PK/2, D3-PK/2,G2-PK/2, I1-PK/2, I2-PK/2, L5, -PK/2, L6-PK/2,	Y	2, 3	1, 3	
3-5 PERFORMANCE INDICATOR									
Students use models to represent objects, processes, and events from the physical setting, the living environment and the technological world.	P - There are performance indicaors for standards where students are asked to explain their understanding of an idea and a model would be an acceptable demonstration but few places where a model as described in the 2007 MLR is required.	Y	N		A2-3/4, L4-3/4, L5-3/4,	Y	2,5		3
a. Represent the features of a real object, event, or process using models including geometric figures, number sequences, graphs, diagrams, sketches, maps, or three-dimensional figures, and note ways in which those representations do not match all features of the originals.	Y for one performance indicator at 9/D. P- There is no requirement in the 1997 MLR to explain how models differ from the real object, eventor process.	Y	N		A2-3/4, L4-3/4, L5-3/4, H5-9/D, H7-9/D, I1-9/D, I3-9/D, L3-9/D, **L5- 9/D (only performance indicator that completely matches)**	Y for all except H5-9/D, H7-9/D, I1-9/D, I3-9/D,L3-9/D, L5-9/D	2, 5		3
6-8 PERFORMANCE INDICATOR									
Students compare advantages and disadvantages of models to examine a variety of real-world phenomena from the physical setting, the living environment and the technological world.	Y- In the instances where models are compared there is seldom a requirement in the 1997 MLR to compare the model to the real thing. As in PK-2 there are performance indicators for standards(A-I) where students are asked to demonstrate/explain their understanding of an idea and a model would be an acceptable demonstration but few places where a model as described in the 2007 PK-2 MLR is required.	P	N		A1-PK/2, I2-6/8, I3-6/8, L3- 6/8, L4-6/8,	Y		3	4
a. Compare different types of models (such as physical, conceptual, and mathematical) that can be used to represent the same thing including chemical reactions, motion, or cells in order to match the purpose and complexity of a model to its use.	Y	P	N		E1- 9/D, M3-9/D, M4-9/D	N		2	4

b. Make changes to models, and suggest how those changes may affect the real thing.	N							3
9 - Diploma PERFORMANCE INDICATOR								
Students evaluate the effectiveness of a model by comparing its predictions to actual observations from the physical setting, the living environment and the technological world.	P - As in PK-2 there are performance indicators for standards(A-I) where students are asked to demonstrate/explain their understanding of an idea and a model would be an acceptable demonstration but few places where a model as described in the 2007 PK-2 MLR is required. In the performance indicator listed there is no requirement that a model is being evaluated.	P	N	K1-9/D, K4-9/D	Y		6	6
A3 CONSTANCY AND CHANGE								
PK-2 PERFORMANCE INDICATOR								
the living environment, and the technological world some things change over time and some	performance indicators do not require that students watch the			B3-PK/2, B3-5/8, D3-3/4, D1-5/8,	B3-5/8, D3-3/4, D1-		2	1
a. Describe the size, weight, color, or movement of things over varying lengths of time, and note other qualities that change or remain the same.	Y/P - Some of the identified performance indicators do not require that students watch the change over time, just that they observe the objects.	Y/P	P	A3-PK/2, A4-3/4, B3-PK/2, B3-5/8, D3-3/4, D1-5/8, D2-5/8, E2-PK/2, E1-3/4, F1-pK/2, F2-PK/2, F3-PK/2, G2-PK/2, H6-5/8, I1-PK/2, J5-3/4, L6-PK/2, L4-3/4, L5-3/4	N- A4-3/4, B3-5/8, D3-3/4, D1-5/8, D2-5/8, E1-3/4, H6-5/8, J5-3/4, L4-3/4, L5-3/4		2	2
3-5 PERFORMANCE INDICATOR								
Students identify basic patterns of change in the physical setting, the living environment and the technological world.		Y	Y	P	D3-3/4, F2-3/4, F4-5/8, K6-PK/2, L4-5/8, L3-9/D, L4-9/D	N -F4-5/8, K6-PK/2, L4-5/8, L3-9/D, L4-9/D	2	2

Indicator	Note			1997 codes			
a. Recognize patterns of change—including steady, repetitive, irregular or apparently unpredictable change.	P	P	P	D3-3/4, F2-3/4, F4-5/8, K6-PK/2, L4-5/8, L3-9/D, L4-9/D	N - F4-5/8, K6-PK/2, L4-5/8, L3-9/D, L4-9/D	2	2
b. Make tables or graphs to represent changes.	P- There is no specific requirement that the graphs represent change.	P	P	L5-PK/2, L4-3/4, L5-3/4, L4-5/8, L4-9/D	N- L5-PK/2, L4-5/8, L4-9/D	5	5
6-8 PERFORMANCE INDICATOR							
Students recognize how patterns of change vary in physical, biological, and technological systems.	Y- But there are many instances (in many grade spans) in the 1997 standards where students are asked to describe change but there is no focus on the patterns of change.	Y	N	D4-9/D,	N	2	2
a. Give examples of systems including ecosystems, Earth systems and technologies that appear to be unchanging, even though things are happening to them, and identify any feedback mechanisms that may be modifying the changes.	Y	Y	N	B3-9/D, B4-9/D,	Y	4	1
b. Describe rates of change and cyclic patterns using appropriate grade level mathematics.	N						
9 - Diploma PERFORMANCE INDICATOR							
Students identify examples of phenomena that result from varying types and rates of change in physical, biological, and technological systems with and without counterbalances.	Y	Y	N	B3-9/D, B4-9/D, D3-9/D, D7-9/D, F2-9/D, F6-9/D	Y	3, 4	1
A4 SCALE							
PK-2 PERFORMANCE INDICATOR							
Students observe and compare differences in scale.	P-Although not specifically required by the 1997 MLR students to observe differences in scale there are many perfomance indicators where students are asked to describe objects where the student could have observed scale.	P	P	A1-PK/2, A1-3/4, C3PK/2, C4-3/4, D4-PK/2, E1-PK/2, L1-PK/2, L5-PK/2, L6-PK/2, L4-3/4, L5-3/4	N- A1-3/4, C4-3/4, L4-3/4, L5-3/4	2, 4	2

a. Compare significantly different sizes, weights, ages, and speeds of objects.	P-Although not specifically required by the 1997 MLR students to observe differences in scale there are many perfomance indicators where students are asked to describe objects where the student could have observed scale.	P	P	A1-PK/2, A1-3/4, C3PK/2, C4-3/4, D4-PK/2, E1-PK/2, L1-PK/2, L5-PK/2, L6-PK/2, L4-3/4, L5-3/4	N- A1-3/4, C4-3/4, L4-3/4, L5-3/4	2, 4		2
3-5 PERFORMANCE INDICATOR								
Students use mathematics to describe scale for human-made and natural things.	P- Although not specifically required by the 1997 MLR to use mathematics to describe scale there are places students are asked to use mathematics and they could have been describing scale, and there are places they are asked to compare objects where they could have compared mathematical differences of scale.	P	N	G2-5/8, G3-5/8, H3-9/D, H7- 9/D, I2- -3/4, I2- 5/8, I3-5/8	N - G2-5/8, G3-5/8, H3-9/D, H7-9/D, I2-5/8, I3-5/8	2, 3, 4	2, 3	
a. Measure things to compare sizes, speeds, times, distances, and weights.	P - Not spocifically required by the 1997 MLR but possible.	P	N	G2-5/8, G3-5/8, H3-9/D, H7- 9/D, I2- -3/4, I2- 5/8, I3-5/8	5/8, G3-5/8, H3-9/D, H7-9/D, I2-5/8, I3-5/8	2, 3, 4	2, 3	
b. Use fractions and multiples to make comparisons of scale.	P - Not spocifically required by the 1997 MLR but possible.	P	N	G2-5/8, G3-5/8, H3-9/D, H7- 9/D, I2- -3/4, I2- 5/8, I3-5/8	N - G2-5/8, G3-5/8, H3-9/D, H7-9/D, I2-5/8, I3-5/8	2, 3, 4	2, 3	
6-8 PERFORMANCE INDICATOR								
Students use scale to describe objects, phenomena, or processes related to Earth, space, matter, and mechanical and living systems.	Y	Y	P- No specific mention of Earth, space, matter, and mechanical or liviing system in the 1997 MLR.	L4-5/8	Y		3	3

a. Describe how some things change or work differently at different scales.	P-Although not specifically required by the 1997 MLR students could offer this as demonstration as of their understanding	P	P	L4-5/8	Y		3	3
b. Use proportions, averages, and ranges to describe small and large extremes of scale.	P-Although not specifically required by the 1997 MLR students could offer this as demonstration as of their understanding	P	P	L4-5/8	Y		3	3
9-Diploma PERFORMANCE INDICATOR								
Students apply understanding of scale to explain phenomena in physical, biological, and technological systems.			P- No specific mention of physical, biological and technological systems in the 1997 MLR.	L3-9/D	Y		3	3
a. Give examples of how large changes of scale may change how physical and biological systems work.	P-Although not specifically required by the 1997 MLR students could offer this as demonstration as of their understanding	P	P	L3-9/D	Y		3	3
b. Mathematically represent large magnitudes of scale.	P-Although not specifically required by the 1997 MLR students could offer this as demonstration as of their understanding	P	P	L3-9/D	Y		3	3
B. THE SKILLS AND TRAITS OF SCIENTIFIC INQUIRY AND TECHNOLOGICAL DESIGN - Students plan, conduct, analyze data from and communicate results of in-depth scientific investigations and use a systematic process, tools, equipment, and a variety of materials to create a technological design producing a solution or product to meet a specified need.	Y	Y	P	Standards J, K, L	Y	N/A	N/A	
B1 SKILLS AND TRAITS OF SCIENTIFIC INQUIRY								
PK-2 PERFORMANCE INDICATOR								

Students plan, conduct, and communicate results of simple investigations.	P- No mention in 1997 MLR that it is a simple investigation, just "answers to questions"	P	N	J1- PK/2, J2-PK/2, J3-PK/2, J1-PK/2, K2-PK/2, K3- PK/2, L3- PK/2, L2-PK/2, L4- PK/2, L5- PK/2, L6-PK/2,	Y	2, 3, 5	1, 2, 3
a. Ask questions and make observations about objects, organisms, and events in the environment.	P - No specificity in 1997 about what the questions should be focused on.	P	N	J3-PK/2, J1-PK/2, K3- PK/2, L3- PK/2,	Y	2, 3	2, 3
b. Plan and safely conduct a simple investigation to answer questions.	P- No mention in 1997 MLR that it is a simple investigation, just "answers to questions"	P	N	J2-PK/2,	Y	3	3
c. Use simple instruments with basic units of measurement to gather data and extend the senses.	Y	Y	N	J1- PK/2,	Y	3	3
d. Know what constitutes evidence used for constructing a reasonable explanation.	Y			J3-PK/2, K2-PK/2,	Y	1, 3	1
e. Use writing, speaking, and drawing to communicate investigations and explanations.	Y	Y	N	L2- PK/2, L4-PK/2, L5- PK/2, L6- PK/2,	Y	3, 5	3
3-5 PERFORMANCE INDICATOR							
Students plan, conduct, analyze data from and communicate results of investigations, including fair tests.	Y	Y	Y	J1-3/4, J2-3/4, J3-3/4, K3-3/4, K4-3/4, L1-3/4 L3-3/4, L5-3/4,	Y	3, 4, 5	3, 4, 5
a. Pose investigable questions and seek answers from reliable sources of scientific information and their own investigations.	P- 2007 adds that investigable questions should be asked	P	N	J2-3/4, J3-3/4, L5-3/4	Y	3, 5	3, 5
b. Plan and safely conduct an investigation including simple experiments that involve a fair test.	P- 2007 MLR adds the idea of safety	P	P	L5-3/4, J2-3/4, L1-3/4	Y	3,5	3, 5
c. Use simple equipment, tools, and appropriate metric units of measurement to gather data and extend the senses.	P- 2007 MLR adds the idea of extending the senses	P	P	J1-3/4,	Y	3	3

d. Use data to construct and support a reasonable explanation.	P- 2007 adds that the explanation should be reasonable	P	P	K3-3/4	Y		3	3
e. Communicate, critique, and analyze own scientific work and the work of other students.	P- 2007 specifically adds that reflection should be to critique and analyze their own work and the work of others - a community engaged in scientific discourse.	P	N	L3-3/4	Y		4	4
6-8 PERFORMANCE INDICATOR								
Students plan, conduct, analyze data from, and communicate results of investigations, including simple experiments.	Y	Y	N	J1-5/8, J2-5/8, K2-5/8, K3-5/8, K4-6/8, K6-5/8, K8-5/8, L1-5/8, L2-5/8, L4-5/8, L5-5/8	Y	2, 3, 5,	1, 2, 3, 5,	
a. Identify questions that can be answered through scientific investigations.	P- the 2007 specifically requires tha student identified questions answerable through scientific investigation	P	N	J2-5/8	Y	3, 5		1
b. Design and safely conduct scientific investigations including controlled experiments.	P- the 2007 specifically adds safety	P	Y	J2-5/8	Y	3, 5	3, 5	
c. Use appropriate tools, metric units and techniques to gather, analyze, and interpret data.	P- the 2007 MLR specifies metric units and notes that tools are used for data collection, analysis and interpretation	P	P	J1-5/8	Y		3	3
d. Use mathematics to ask questions; gather, organize, and present data; and structure convincing explanations.	Y- 2007 MLR focuses specifically on use of mathematics	Y	N	L4-5/8, L5-5/8	Y		3	3
e. Use logic and critical reasoning to develop descriptions, explanations, predictions, and models using evidence.	P - 2007 requires the application of logic and critical in these contexts not as stand alones as in 1997	Y	N	J2-5/8, K6-5/8, K8-5/8, L1-5/8, L2-5/8	Y	2, 3		3
f. Recognize alternative explanations and predictions.	N- 1997 requires that students recognize approaches that might lead to alternative explanations	N	N	K2-5/8, K3-5/8, K4-6/8	Y		2	2
g. Communicate scientific procedures and explanations.	P- 2007 adds the requirement of communicating procedures	P	P	L1-5/8, L4-5/8	Y		2	2
9-Diploma PERFORMANCE INDICATOR								

Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis.	P- 2007 adds that the experiments must be in depth and guided by testable hypotheses	P	P	J2-9/D, J3-9/D, K1-9/D, K3-9/D, K4-9/D, K5-9/D, K6-9/D, L1-9/D, L2-9/D, L4-9/D, L5-9/D, L6-9/D, L7-9/D		3, 4, 5	2, 3, 4, 5	
a. Identify questions, concepts, and testable hypotheses that guide scientific investigations.	P - 2007 MLR adds that students can specifically connect the purpose with the the investigation	P	N	J3-9/D	Y		3	2
b. Design and safely conduct methodical scientific investigations, including controlled experiments. Use statistics to analyze and interpret results.	P - 2007 MLR adds a focus on safetly, controlled experiments and use of statistics.	P	N	J2-9/D, J3-9/D, K4-9/D, L4-9/D	Y	3, 5	3, 5	
c. Formulate and revise scientific investigations and models using logic and evidence.	Y	Y	N	K3-9/D, K5-9/D, K6-9/D, L4-9/D	Y		3	3
d. Use a variety of tools and technologies to improve investigations and communications.	Y	Y	N	K4-9/D,L1-9/D, L2-9/D, L6-9/D, L7-9/D	Y		3	3
e. Recognize and analyze alternative explanations and models using scientific criteria.	P- 2007 adds that scientific ideas must be evaluated using scientific criteria.	P	N	K1-9/D, K4-9/D, K6-9/D, L5-9/D	Y		4	2, 4
f. Communicate and defend scientific ideas.	Y	Y	N	L2-9/D, L3- 9/D, L4-9/D	Y	3, 4	2, 4	
B2 SKILLS AND TRAITS OF TECHNOLOGICAL DESIGN								
PK-2 PERFORMANCE INDICATOR								
Students use a simple design process, and basic tools and materials to solve a problem or create a product.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	P	J1-PK/2, J2-PK/2, L2-PK/2, L4-PK/2, L6-PK/2	Y	2, 3	2, 3	
a. Describe a design problem in students' own words.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	N	J2-PK/2	Y		3	2
b. Propose a way to build something or get something to work better.	N							
c. Use suitable tools, materials, safe techniques, and measurements to implement a proposed solution to a design problem.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	P	J1-PK/2	Y		3	3

d. Judge how well a product or design solved a problem.	N						
e. Present a design or solution to a problem, using oral, written, or pictorial means of communication.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	P	L2-PK/2, L4-PK/2, L6-PK/2	Y	2, 3	2, 3
3-5 PERFORMANCE INDICATOR							
Students use a design process, simple tools, and a variety of materials to solve a problem or create a product, recognizing the constraints that need to be considered.	P- 2007 MLR adds focus on different materiasl and contraints	P	N	J1-3/4, J4-3/4, L3-3/4	Y	2, 3, 4, 5,	3, 5, 6
a. Identify and explain a simple design problem, task, and solution related to the problem.	Y	Y	N	J4-3/4	Y	2, 4	2
b. Propose a solution to a design problem that recognizes constraints such as cost, materials, time, space, or safety.	P - 2007 MLR adds specificity about the criteria in the process	P	N	J4-3/4	Y	2, 4	3, 5
c. Use appropriate tools, materials, safe techniques, and quantitative measurements to implement a proposed solution to a design problem.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	P	J1-3/4	Y	2	3
d. Balance simple constraints in carrying out a proposed solution to a design problem.	P - 2007 MLR adds specificity about the criteria in the process	P	N	J4-3/4	Y	3, 5	3
e. Evaluate own design results as well as those of others, using established criteria in their evaluations.	P - 2007 MLR adds specificity about the purpose for the reflection	P	P	L3-3/4	Y	6	6
f. Modify designs based on results of evaluations.	P - 2007 MLR adds specificity about the purpose for the reflectiosn	P	N	L3-3/4	Y	5	3
g. Use oral, written, and pictorial means of communication to present the process and result of a design problem.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	N	L3-3/4	Y	5	3
6-8 PERFORMANCE INDICATOR							

Students use a systematic process, tools, equipment, and a variety of materials to design and produce a solution or product to meet a specified need, using established criteria.	P- 2007 adds greater specificity about technological design	P	N	J6-5/8, L1-5/8, L2-5/8, L3-5/8	Y	2, 3, 4, 5,	2, 3, 5, 6
a. Identify appropriate problems for technological design.	P- 2007 adds greater specificity about technological design	P	N	J6-5/8	Y	3, 5	2
b. Design a solution or product.	Y			J6-5/8	Y	3, 5	5
c. Communicate a proposed design using drawings and simple models.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	N	L4-5/8	Y	2, 3	2, 3
d. Implement a proposed design.	Y			J6-5/8	Y	3, 5	3
e. Evaluate a completed design or product.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	N	L3-5/8	Y	4	6
f. Suggest improvements for their own and others' designs and try out proposed modifications.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	N	L3-5/8	Y	4	3
g. Communicate the process of technological design, including a review and description of the completed design or product.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	N	L1-5/8, L2-5/8	Y	2, 3	2
9-Diploma PERFORMANCE INDICATOR							
Students use a systematic process, tools and techniques, and a variety of materials to design and produce a solution or product that meets new needs or improves existing designs.	P- 2007 adds greater specificity about technological design	P	N	J4-9/D, L1-9/D, L2-9/D, L3-9/D, L4-9/D		3, 4, 5	2, 3, 5, 6
a. Identify new problems or a current design in need of improvement.	P- 2007 adds greater specificity about technological design	P	N	J4-9/D		3, 5	2
b. Generate alternative design solutions.	P- 2007 adds greater specificity about technological design	P	N	L2-9/D		3, 4	5

c. Select the design that best meets established criteria.	P- 2007 adds greater specificity about technological design	P	N	L2-9/D		3, 4	6
d. Use models and simulations as prototypes in the design planning process.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	N	J4-9/D		3, 5	3
e. Implement the proposed design solution.	Y	Y	N	J4-9/D		3, 5	3
and the consequences of that solution.	about the purpose for the	P	N	L1-9/D, L2-9/D		3, 4	6
g. Communicate the problem, process, and solution to a design problem.	P - 2007 MLR adds that students must specifically be engaged in the design process as distinct from scientific investigation	P	N	L2-9/D, L3-9/D, L4-9/D		2, 3	2
C. THE SCIENTIFIC AND TECHNOLOGICAL ENTERPRISE – Students understand the history and nature of scientific knowledge and technology, the processes of inquiry and technological design, and the impacts science and technology have on society and the environment.	N- Parts of this standard exist in the 1997 MLR and parts do not. Performance indicator C1 represents knowledge not found in the 1997 MLR. C1 outlines what students should know about the manner in which scientists generate, share and scrutinize scientific knowledge. C2 outlines understandings about the use and development of technology.						
C1 UNDERSTANDINGS OF INQUIRY							
PK-2 PERFORMANCE INDICATOR							
Students describe the use of questions, and accurate communication in scientists' work.	N						
a. Describe how scientific investigations involve asking and answering a question.	N						
b. Point out the importance of describing things and investigations accurately so others can learn about them or repeat them.	N						
3-5 PERFORMANCE INDICATOR							
Students describe how scientific investigations result in explanations that are communicated to other scientists.	N						

a. Describe how scientists develop explanations based on observations, evidence and knowledge of the natural world.	N							
b. Describe how scientists make their explanations public.	N							
6-8 PERFORMANCE INDICATOR								
Students describe how scientists use varied and systematic approaches to investigations that may lead to further investigations.	N							
a. Explain how the type of question informs the type of investigation.	N							
b. Explain why it is important to identify and control variables, and replicate trials in experiments.	N							
c. Describe how scientists' analysis of findings can lead to new investigations.	N							
9-Diploma PERFORMANCE INDICATOR								
Students describe key aspects of scientific investigations: that they are guided by scientific principles and knowledge; that they are performed to test ideas and that they are communicated and defended publicly.								
a. Describe how hypotheses as well as past and present knowledge guide and influence scientific investigations.	P- 1997 focuses on the historical connection but does not make the connection to the hypotheses of scientist			M5-9/D	Y	Unclear	2	
b. Describe how scientists defend their evidence and explanations using logical arguments and verifiable results.	N							
C2 UNDERSTANDINGS ABOUT SCIENCE AND TECHNOLOGY								
PK-2 PERFORMANCE INDICATOR								
Students recognize that people have always engaged in science and technology, and that there is a difference between the natural and designed worlds.	N							
a. Recognize that people have always had problems and invented tools and ways of doing things to solve problems.	N							

b. Distinguish between objects that occur in nature and objects that have been made by people.	N							
3-5 PERFORMANCE INDICATOR								
Students describe why people use science and technology, and how scientists and engineers work.	N							
a. Describe how scientists seek to answer questions and explain the natural world, while engineers seek solutions to problems through the design and production of products.	N							
6-8 PERFORMANCE INDICATOR								
Students recognize the differences between scientific inquiry and technological design.	P		P	P	J4-5/8,M6-5/8	Y	1, 4	2, 4
a. Compare and contrast the processes of scientific inquiry and technological design.	Y		Y	Y	J4-5/8	Y		4	4
b. Explain how constraints and consequences relate to scientific inquiry and technological design.	P- 1997 does not specifically mention technology and focuses solely on consequences without mentioning constraints		P	P	M6-5/8	Y		1	2
9-Diploma PERFORMANCE INDICATOR								
Students explain how the relationship between the research and knowledge of scientists and, the design process and products of engineers influences the advancement of ideas and designs.	P		P	Y	M4-9/D	Y		4	1
a. Provide an example that shows how science advances with the introduction of new technologies and how solving technological problems often impacts new scientific knowledge.	P- 1997 does not specify what the scientific and technological impacts are on		P	Y	M4-9/D	Y		4	1
b. Provide examples of how creativity, imagination, and a good knowledge base are required to advance scientific ideas and technological design.	N							
c. Give examples of how technological solutions to problems sometimes create new problems.	P- 1997 does not specify what the scientific and technological impacts are on		P	Y	M4-9/D	Y		4	1
C3 SCIENCE, TECHNOLOGY, AND SOCIETY								
PK-2 PERFORMANCE INDICATOR								
No performance indicator.								

	1997 Notes				M codes			
3-5 PERFORMANCE INDICATOR								
Students identify and describe the influences of science and technology on people and the environment.		P	P	P	M2-PK/2, M5-PK/2, M3-3/4	P	2	1, 2
a. Explain how science and technology can help people make safe and healthy decisions.		Y	Y	N	M2-PK/2, M5-PK/2, M3-3/4	P	2	2
b. Give examples of changes in the environment caused by natural or human-made influences.	P- 1997 MLR does not specify the distinction between natural or human-made influences	P	N		M5-PK/2	Y	2	1
c. Identify that natural resources are limited, and conserving them, decreasing their use and using renewable resources is important.		Y	Y	Y	M4-3/4	Y	2	2
6-8 PERFORMANCE INDICATOR								
Students describe the relationship of science and technology in addressing personal and societal challenges.		P	P	P	M1-5/8, M3-5/8, M4-5/8, M6-5/8	Y	1, 2, 5	1, 2
a. Identify the challenges to society that science and technology can help address including population, natural hazards, sustainability, personal health, and environmental quality.	P- 1997 focuses on the impacts of scientfic and technological development	P	N		M1-5/8, M6-5/8	Y	1, 5	2
b. Identify personal choices that can either positively or negatively impact society in such areas as population, ecosystem sustainability, personal health and environmental quality.	P- 1997 focuses on the"biological and other impacts"	P	N		M4-5/8	Y	2	2
c. Describe how science and technology are used to address societal concerns related to environmental quality and personal health and safety.	P- 1997 does not specifically ask for this focus, rather is focuses on "actions which may have expected or unexpected consequences that are positive, negative or both"	P	N		M6-5/8	Y	1	2
d. Identify the factors that influence the development and use of science and technology.	P- 1997 focuses only on ethical issues	P	Y		M3-5/8	Y	Unclear	1
9-Diploma PERFORMANCE INDICATOR								
Students describe the role of science and technology in creating and solving contemporary issues and challenges.		P	P	N	M2-5/8, M4-5/8, M5-5/8	Y	Unclear and 4	2
a. Explain how science and technology influence the carrying capacity and sustainability of the planet.	P-1997 does not specifically require that students address carrying capacity and sustainability	P	N		M2-5/8, M4-5/8	Y	Unclear and 4	2

b. Explain how ethical, societal, political, economic, and cultural factors influence personal health, safety and the quality of the environment.	P-1997 does not specifically require that students address ethical, societal, economic and cultural	P	N	M4-5/8	Y		4	2
c. Explain how ethical, societal, political, economic, religious, and cultural factors influence the development and use of science and technology.	P-1997 MLR focuses only on the historical relationship of cultural beliefs on science an technology	P	N	M5-5/8	Y	Unclear		2
C4 HISTORY AND NATURE OF SCIENCE								
PK-2 PERFORMANCE INDICATOR								
No performance indicator.	N/A							
3-5 PERFORMANCE INDICATOR								
No performance indicator.	N/A							
6-8 PERFORMANCE INDICATOR								
Students describe how science advances knowledge through the scientists involved, the ways they think about their work and that of others, and through historical examples.	P	P	N	M2-5/8	Y		2	2
a. Describe how women and men of various backgrounds, working in teams or alone but communicating extensively with others, engage in science, engineering and related fields.	N							
b. Describe a breakthrough from the history of science that contributes to our current understanding of science.	Y	Y	N	M2-5/8	Y		2	2
c. Describe the basis for understanding science as a human endeavor that generates explanations based on verifiable evidence and why it is subject to change when new evidence does not match existing explanations.	N							
9-Diploma PERFORMANCE INDICATOR								
Students describe the human dimensions and traditions of science, the nature of scientific knowledge, and historical episodes in science that impacted science and society.	P	P	N	M5-9/D	Y	Unclear		1
a. Describe the ethical traditions in science including peer review, truthful reporting, and making results public.	N							

b. Select one of the major episodes in the history of science and describe how the scientific knowledge changed over time, and the important effects on science and technology.	N							
c. Give examples of how societal, cultural, and personal beliefs and ways of viewing the world could bias scientists.	P- 1997 MLR requires that students examine historial relationships between cultural beliefs and breakthroughs and does not focus on bias in the scientist	P	N	M5-9/D	Y	Unclear		1
d. Provide examples of criteria that distinguish scientific explanations from pseudoscientific ones.	N							
D. THE PHYSICAL SETTING - Students understand the universal nature of matter, energy, force and motion, and identify how these relationships are exhibited in Earth Systems, in the solar system and throughout the universe.								
D1 UNIVERSE AND SOLAR SYSTEM								
PK-2 PERFORMANCE INDICATOR								
Students describe the movement of objects across the sky, as seen from the Earth.	P- 2007 MLR more specific than 1997 about the aspects of the day and night.	P	N	G1-PK/2	Y		2	2
a. Describe how the sun and moon seem to move across the sky.	P- 2007 MLR more specific than 1997 about the aspects of the day and night.	P	N	G1-PK/2	Y		2	2
b. Describe the changes in the appearance of the moon from day to day.	P- 2007 MLR more specific than 1997 about the aspects of the day and night.	P	N	G1-PK/2			2	2
3-5 PERFORMANCE INDICATOR								
Students describe the positions and apparent motions of different objects in and beyond our solar system, and how these objects can be viewed from Earth.	P	P	P	G1-3/4, G4-3/4, G3-PK/2	Y	2, 3	2, 3	
a. Show the locations of the sun, earth, moon, and planets and their orbits.	P- 2007 MLR adds the idea of orbit	P	Y	G1-3/4, G4-3/4,	Y	unclear (2, 3)		3
b. Observe and report on observations that the sun appears to move across the sky in the same way every day, but its path changes slowly over the seasons.	P- 2007 MLR focuses students on observing the motions of the sun in the sky	P	N	G1-3/4, G4-3/4, G3-PK/2	Y	unclear		2
c. Recognize that the sun is a star and similar to other stars in the universe.	P- 2007 MLR adds idea that stars are alike	P	P	G3-PK/2	N	unclear		2

6-8 PERFORMANCE INDICATOR							
Students explain the movements, and describe the location, composition, and characteristics of our solar system and vast universe, including planets, the sun, and galaxies.	P	P	P	G1-5/8, G2-5/8, G4-5/8, G5-5/8	Y	2, 4	2
a. Describe the different kinds of objects in the solar system including planets, sun, moons, asteroids and comets.	P- 2007 MLR adds planets and moons	P	Y	G1-5/8, G4-5/8	Y	2, 4	2
b. Explain the motions that cause days, years, phases of the moon and eclipses.	Y	Y	N	G5-5/8	Y	2	2
c. Describe the location of our solar system in its galaxy as well as the existence of other galaxies made up of stars and planets.	Y	Y	N	G2-5/8	Y	2	2
9-Diploma PERFORMANCE INDICATOR							
Students explain the physical formation and changing nature of our universe and solar system, and how our past and present knowledge of the universe and solar system developed.	P	P	N	G3-9/D, I2-9/D	y	2	2
a. Explain why the unit of light years can be used to describe relative distances to objects in the universe.	Y	Y	N	G3-9/D	Y	2	2
b. Explain the role of gravity in forming and maintaining planets, stars, and the solar system.	P - 1997 focuses on describing current theories of gravitational force and does not connect to celestial bodies	P	N	I2-9/D	Y	2	2
c. Outline the age, origin and process of formation of the universe as currently understood by science.	N						
D2 EARTH							
PK-2 PERFORMANCE INDICATOR							
Students describe Earth's weather and surface materials and the different ways they change.	P	P	P	F1-PK/2, H1-PK/2	Y	2	2
a. Explain that the Sun warms the air, water and land.	P- 2007 focuses on heat not light and adds what the sun warms	P	N	H1-PK/2	Y	unclear	2
b. Describe the way in which weather changes over months.	Y	Y	Y	F1-PK/2	Y	2	2
open container compared to water left in a closed container.	N						
3-5 PERFORMANCE INDICATOR							

Description	Notes				Code				
Students describe the properties of Earth's materials, the processes that change them, and cycles that affect the Earth.					F1-PK/2, F2-3/4, F3-PK/2, F3-3/4, F4-3/4				
a. Explain the effects of the rotation of Earth on the day/night cycle, and how that cycle affects local temperature.	P- 2007 MLR is focuses on effects of day/night on weather not climate cycles	P	N		F2-3/4	Y	unclear	2	
b. Describe the various forms water takes in the air and how that relates to weather.	P- 2007 MLR focuses on concrete example connecting water and weather not the water cycle	P	N		F4-3/4	Y	unclear(2, 3)	2	
c. Explain how wind, waves, water, and ice reshape the surface of Earth.	Y	Y	P		F3-PK/2	N	2	2	
d. Describe the kinds of material that form rocks and soil.	P- 1997 is more general about differnences minerals, rocks, and soils	P	P		F3-3/4	Y	2	2	
e. Recognize that the sun is the source of Earth's heat and light energy.	Y	Y	N		F1-PK/2	N	unclear(2, 3)	2	
6-8 PERFORMANCE INDICATOR									
Students discuss the various cycles, physical and biological forces and processes, position in space, energy transformations, and human actions that affect short-term and long-term changes to the Earth.	P	P	N		B2-5/8, F1-5/8, F2-5/8, F4-5/8, F5-5/8,		2, 3, 4,	2	
a. Recognize that in temperate regions the sun rises higher in the sky during the summer than in the winter, and explain this in relation to change in the path of the sun and the tilt of Earth's rotational axis relative to the plane of its yearly orbit around the Sun.	Y	Y	N		F1-5/8	Y	unclear (2, 3)	2	
b. Describe Earth Systems – biosphere, atmosphere, hydrosphere and lithosphere – including some of the cycles and interactions such as water moving among and between them, rocks forming and transforming, and weather formation.	Y	Y	N		F2-5/8, F5-5/8, F4-3/4	N - F4-3/4	2, 3,	2	
c. Give several reasons why the climate is different in different regions of the Earth.	N								
d. Discuss the importance and limitations of Earth's resources.	Y	Y	N		B2-5/8	Y	4	2	
e. Describe the effect of gravity on objects on Earth.	N								
f. Give examples of both abrupt changes and slow changes in Earth Systems.	P - 1997 focus on factors that cause the changes	P	N		F4-5/8	Y	2	2	

9-Diploma PERFORMANCE INDICATOR							
Students analyze the biological, physical, energy, and human interactions that shape and alter Earth Systems.	P	P	N	F1-9/D, F2-9/D, F3-9/D, F6-9/D, M2-9/D	Y	2, 4	4
a. Explain how solar radiation, ocean currents, and atmospheric conditions influence the habitability of life on Earth.	Y	Y	N	F1-9/D, F2-9/D	Y	2, 4	2
b. Describe factors that influence plate tectonics.	Y	Y	N	F6-9/D	Y		
c. Describe biological and geophysical influences on the origin and changing nature of Earth Systems.	P- 1997 does not specifically include biological	P	N	F2-9/D, F3-9/D	Y	2,4	2
d. Describe human influences on the changing Earth Systems.	Y	Y	N	M2-9/D	Y	Unclear(2, 3)	2
D3 MATTER AND ENERGY							
PK-2 PERFORMANCE INDICATOR							
Students use observable characteristics to describe objects and materials and changes to physical properties of materials.	P	P	P	E2-PK/2	Y	2	2
a. Describe objects in terms of what they are made of and their physical properties.	P- 2007 adds composition of the objects	P	Y	E2-PK/2	Y	2	2
b. Describe changes in properties of materials when mixed, heated, frozen, or cut.	N						
3-5 PERFORMANCE INDICATOR							
Students describe properties of objects and materials before and after they undergo a change or interaction.	P	P	N	E1-PK/2, E2-3/4	P	2, 3	2
a. Describe the relation of the weight of an object and the sum of the weight of its parts.	P- 1997 just focuses on objects being made of smaller parts	P	N	E1-PK/2	N	Unclear (2, 3)	2
b. Illustrate how many different substances can be made from a small number of basic ingredients by using a description of the properties of original materials and the new material formed.	P- 1997 talks about elements not substances	P	N	E6-5/8	N	2	2
c. Describe what happens when an object or process gives off heat and is near a cool object.	N						
d. Describe how the heating and cooling of water and other materials can change the properties of the materials.	P-1997 focuses on general physical and chemical change	P	N	E2-3/4	Y	2	2

e. Explain that the properties of a material may change but the total amount of material remains the same.	P-1997 focuses on general physical and chemical change	P	N	E2-3/4	Y		2	2	
6-8 PERFORMANCE INDICATOR									
Students describe physical and chemical properties of matter, interactions and changes in matter, and transfer of energy through matter.	P	P	P	E1-5/8, E2-5/8, E3-5/8, E5-5/8, E7-5/8, H1-3/4, H2-5/8, H3-5/8	P	2, 3, 4		2	
a. Describe that all matter is made up of atoms and distinguish between/among elements, atoms, and molecules.	Y- 1997 mentions atoms and smaller particles	P	N	E2-5/8	Y		2	2	
b. Describe how physical characteristics of elements and types of reactions they undergo have been used to create the Periodic Table.	P-1997 requires use of Periodic Table to group elements	P	N	E3-5/8	Y		3	2	
c. Describe the difference between physical and chemical change.	N								
d. Explain the relationship of the motion of atoms and molecules to the states of matter for gases, liquids and solids.	Y	Y	Y	E5-5/8	Y		2	2	
e. Explain that atoms can be packed together in large arrays that compose all substances including compounds mixtures and solutions.	Y	Y	Y	E7-5/8	Y		4	2	
f. Explain that some characteristics of matter including density, boiling point, solubility, are not dependent on the amount of matter present and other characteristics are.	P- 1997 focuses only on density and bouyancy	P	P	E1-5/8	Y		4	2	
g. Use the idea of atoms to explain the conservation of matter.	P-2007 adds the idea of atoms	P	P	E8-5/8	Y	Unclear (2, 3)	2, 3		
h. Describe several different types of energy forms including heat energy, chemical energy, and mechanical energy.	P- 1997 does not specify heat, chemical and mechanical	P	P	H1-3/4	N		2	2	
i. Use examples of energy transformations from one form to another to explain that energy cannot be created or destroyed	P- 1997 does not require the use of examples	P	P	H2-5/8	Y	Unclear (2, 3)	2, 3		
j. Explain that heat is transferred from one object to another by conduction, convection and/or radiation.	Y	Y	N	H3-5/8	Y		4	2	
k. Describe the properties of solar radiation and its interaction with objects on Earth.	N								
9-Diploma PERFORMANCE INDICATOR									

Indicator	1997 Comparison				Code(s)	Match			
Students describe the structure, behavior, and interactions of matter at the atomic level and the relationship between matter and energy.	P		P	P	E2-5/8, E2-9/D, E4-9/D, E5-9/D, E7-9/D, H1-9/D, H2-9/D, H6-9/D, I6-9/D	N	2, 4		2
a. Describe the structure of atoms in terms of neutrons, protons and electrons.	P- 1997 refers to "certain smaller particles" of the atom	Y	N		E2-5/8	N		2	2
b. Describe how the number and arrangement of atoms in a molecule determines a molecule's properties, including the types of bonds it makes with other molecules and its mass.	P- 1997 focuses on how the atoms are joined	P	N		E5-9/D	Y		2	2
c. Describe how light is emitted and absorbed by atoms changing energy levels, the results of which can be used to identify a substance.	N								
d. Describe factors that affect the rate of chemical reactions.	P - 1997 MLR focuses on how the matter, not the rate of reaction is affected by …	P	N		E2-9/D	Y		4	2
e. Describe nuclear reactions and the energy they release.	Y	Y	Y		E7-9/D, H6-9/D	Y		2	2
f. Explain the relationship between kinetic and potential energy.	Y	Y	Y		E4-9/D	Y		4	2
g. Describe that in energy transformations the total amount of energy remains the same but because of inefficiencies heat is usually produced which diffuses by radiation or conduction into cooler places, causing a loss of useful energy.	Y	Y	N		H1-9/D and H2-9/D	N	Unclear and 4		2
h. Describe radioactive decay and half-life.	P- 1997 omits half-life	P	Y		E7-9/D	Y		2	2
i. Explain the nuclear fusion process that causes stars to produce huge quantities of energy.	P- 1997 does not specify a connection of fusion with stars	P	Y		E7-9/D	Y		2	2
j. Describe the relationship between heat, and temperature in terms of the actions of atoms, molecules, and ions.	P - 1997 MLR does not mention ions	P	Y		I6-9/D	Y		2	2
D4 FORCE AND MOTION									
PK-2 PERFORMANCE INDICATOR									
Students describe how objects move in different ways.	P		P	P	I1-PK/3, I2PK/2	Y	Unclear (1, 2, 3)	1, 2	
a. Describe different ways things move and what it takes to start an object moving or to keep objects moving.	Y	Y	Y		I1-PK/2, I2PK/2	Y	Unclear (1, 2, 3)	1, 2	
b. Give examples of things that make sound by vibrating.	N								

3-5 PERFORMANCE INDICATOR								
Students summarize how various forces affect the motion of objects.		Y	Y	P	I1-3/4, I2-3/4, I3-3/4	Y	2, 5	2, 5
a. Predict the effect of a given force on the motion of an object.		Y	Y	N	I2-3/4	Y	5	5
things move and how long it takes them to go a certain distance.		Y	Y	N	I3-3/4	Y	2	2
c. Give examples of how gravity, magnets, and electrically charged materials push and pull objects.		Y	Y	Y	I1-3/4	Y	2	2
6-8 PERFORMANCE INDICATOR								
Students describe the force of gravity, the motion of objects and the nature of energy in light and waves.		P	P	N	H3- 5/8, I1-5/8, I2-5/8, I2-9/D	Y	2, 3, 4	2
a. Describe the kind of motion that sound, earthquake and light waves have in common, and how their motions are different.	P-1997 has greater focus on the movement of heat energy	P	N		H3- 5/8	Y	4	2
b. Explain the relationship between visible light, the electromagnetic spectrum and sight.	N							
c. Explain how the gravitational force between any two objects would change if the distance between them changed or their mass changed.	P - 1997 focuses on describing current theories of gravitational force	P	N		I2-9/D	Y	2	2
d. Explain that electric currents and magnets can exert force on each other.	N							
e. Describe the effects of different types of force on an object and how unbalanced forces will cause changes in the speed or direction.	P- 1997 focuses more on pairing Newton's laws with examples of motion and use of mathematical analysis	P	N		I1-5/8, I2-5/8	Y	2, 3	2
9-Diploma PERFORMANCE INDICATOR								
Students understand that the laws of forces and motion are the same across the universe.	P	P	N		G1-9/D, H7-9/D, I2-9/D, I3-9/D, I6-9/D	Y	2, 3	2
a. Describe the intellectual developments that have led to our present understanding of the universe structure and motion.	P- 1997 focuses on how scientists gather information about the universe -	P	N		G1-9/D	Y	2	2
b. Describe Newton's concept of gravity, using the motion of galaxies, stars, planets, moons, comets, and various events on Earth as examples.	P- 2007 focuses specifically on Newton concept of gravity	P	N		I2-9/D	Y	2	2
c. Describe the contribution of Newton to our understanding of force and motion, and give examples of his three laws of motion.	P- 1997 MLR focuses on mathematical application of Newton's laws	P	N		I3-9/D	Y	3	2

d. Explain the ideas of relative motion and frame of reference.	N						
e. Describe some of the conceptual considerations in modern technologies that are based on the interplay of magnetic and electric forces.	P - 1997 MLR focuses on the general effect of forces and the behavior of atoms	P	N	I6-9/D, H7-9/D	Y	2	2
E. THE LIVING ENVIRONMENT - Students understand that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Students understand their similarities and differences, as humans, to other organisms and their interconnections to these interdependent webs.							
E1 BIODIVERSITY							
PK-2 PERFORMANCE INDICATOR							
Students describe similarities and differences in the observable behaviors, features, and needs of plants and animals.	Y	Y	Y	A1- PK/2, A2-PK/2, A3- PK/2, D2-PK/2		1, 2	2
a. Describe similarities and differences in the way plants and animals look and the things that they do.	Y	Y	Y	A1- PK/2, A2-PK/2	Y	1, 2	2
b. Describe some features of plants and animals that help them live in different environments.	Y	Y	Y	D2-PK/2	Y	1	2
c. Describe how organisms change during their lifetime.	Y	Y	Y	A3- PK/2	Y	2	2
3-5 PERFORMANCE INDICATOR							
Students compare living things based on their behaviors, external features, and environmental needs.	P	P	Y	A1-3/4, A2-3/4, A3- PK/2	Y	2, 3, 5	2
a. Describe how living things can be sorted in many ways, depending on which features or behaviors are used to sort them.	P- 1997 requires sorting/classifying but not a consideration of the features	P	Y	A1-3/4, A2-3/4	Y	2, 3, 5	2
b. Describe the changes in external features of organism during their life cycles.	Y	Y	Y	A3- PK/2	Y	2	2

6-8 PERFORMANCE INDICATOR								
Students differentiate among organisms based on biological characteristics, and identify patterns of similarity.	P	P	N	A2-5/8, A3-5/8, B2-3/4, C2-3/4	P		2	2
a. Compare physical characteristics that differentiate organisms into plants that use sunlight to make their own food, animals that consume energy rich food, and microscopic organisms that cannot be easily classified as either.	Y	Y	N	B2-3/4, C2-3/4	N		2	2
b. Explain that biologists use internal and external anatomical features to determine relatedness among organisms and to form the basis for classification systems.	P- 1007 has somewhat narrower focus related to naming organisms	P	N	A2-5/8	Y	Unclear		2
c. Give the definition of a species for organisms that combine genetic information.	N							
d. Explain that external and internal structures of animals and plants contribute to the variety of ways organisms are able to find food and reproduce.	Y- 1997 also includes focus on behaviors as well as structures	Y	N	A3-5/8	Y		2	2
9-Diploma PERFORMANCE INDICATOR								
Students analyze the evidence for relatedness among and within diverse populations of organisms, and the importance of biodiversity.	P	P	P	A1-9/D, A3-9/D, D3-9/D	Y		2	2
a. Explain how the variation in structure and behavior of a population of organisms may influence the likelihood that some members of the species will have adaptations that allow them to survive in a changing environment.	P- 1997 does not connect variation to survival	P	N	A3-9/D, D3-9/D	Y		2	2
b. Describe the role of DNA sequences in determining the degree of kinship among organisms and the identification of species.	Y- 1997 includes relationship to evolutionary change	Y	Y	A1-9/D	Y		2	2
E2 ECOSYSTEMS								
PK-2 PERFORMANCE INDICATOR								
Students understand how plants and animals depend on each other and the environment they live in.	P	P	P	B2-PK/2, B3-3/4	P	2, 4		2
a. Explain that animals use plants and other animals for food, shelter and nesting.	P- 1997 MLR focuses on plants being the ultimate source of animal food	P	Y	B2-PK/2	Y		2	2
b. Compare different animals and plants that live in different parts of the world.	Y- 1997 focuses on living and physical components	Y	N	B3-3/4	N		4	2

3-5 PERFORMANCE INDICATOR								
Students describe ways organisms depend upon, interact within, and change the living and nonliving environment as well as ways the environment affects organisms, biomes, and ecosystems.				B2-PK/2, B2-5/8, B4-3/4				
a. Explain how changes in an organism's habitat can influence its survival.	Y- 1997 MLR more general, focuses on connection between living/non-living components	Y	N	B4-3/4	Y	unclear		2
b. Describe that organisms all over the Earth are living, dying, decaying and new organisms are being produced by the old ones.	P- 1997 focuses on the differences among decomposers, producers . . .	P	N	B2-5/8	Y		2	2
c. Describe some of the ways in which organisms depend on one another.	Y	Y	N	B4-3/4	Y		1	2
d. Explain how the food of most animals can be traced back to plants and how the animal uses food for energy and repair.	P-1997 does not mention use of food for energy and repair	P	N	B2-PK/2, B4-3/4	N	unclear and 2		2
6-8 PERFORMANCE INDICATOR								
Students examine how the characteristics of the physical, non-living (abiotic) environment, the types and behaviors of living (biotic) organisms, and the flow of matter and energy affect organisms and the ecosystem of which they are part.	P	P	P	B1-9/D, B2-5/8, B4-5/8, B5-5/8, E4-9/D	P	2, 4		2
a. List various kinds of resources within different biomes for which organisms may need to compete.	Y	Y	N	B2-5/8	Y		4	2
b. State the main ways in which two types of organisms may interact including competition, predator/prey, producer/consumer/decomposer, parasitism, mutualism, and state the positive and negative consequences such interactions have.	P- 2007 MLR adds focus on +/- consequences of interactions	P	Y	B4-5/8	Y		2	2
c. Describe the source and flow of energy in the two major food webs, terrestrial and marine.	N							
d. Describe how matter and energy change from one form to another in living things and physical environment.	P- 2007 MLR adds focus on energy	P	N	B5-5/8	Y		2	2
e. Explain that the total amount of matter in the environment stays the same as its form and location change.	P- 2007 adds the form and location change	P	N	E4-9/D, B5-5/8, B1-9/D	N		2	2

9-Diploma PERFORMANCE INDICATOR								
Students analyze the interactions, cycles, and factors that affect short and long-term ecosystem stability and change.	P		P	P	B1-9/D, B2-9/D, B3-9/D, M2-9/D	Y	2, 4	2
a. Explain why ecosystems can be reasonably stable over hundreds or thousands of years, even though populations may fluctuate.	P- 1997 foucs is on the population not the ecosystem		P	Y	B3-9/D	Y	4	2
b. Explain dynamic equilibrium in ecosystems and some factors that can, in the long run, lead to change in the normal pattern of cyclic fluctuations.	Y		Y	N	M2-9/D	Y	Unclear	2
c. Explain the concept of carrying capacity and list factors that determine the amount of life that any environment can support.	N							
elements that make up molecules are transformed in ecosystems, and how they obey basic conservation laws, and explain the	Y		Y	N	B1-9/D, B2-9/D	Y	2, 4	2
E3 CELLS								
PK-2 PERFORMANCE INDICATOR								
Students describe parts and wholes of living things, their basic needs, and the structures and processes that help them stay alive.	P		Y	N	C1- PK/2, C2-PK/2, C3- PK/2	Y	2,3	1
a. List some things that are so small we cannot see them without using magnifying lenses.	Y		Y	N	C3- PK/2	Y	unclear	1
b. List the basic things that most organisms need to survive, no matter what their size.	Y- 1997 MLR does not make the connection between structures and survival		Y	N	C1- PK/2, C2-PK/2	Y	unclear(2, 3)	1
3-5 PERFORMANCE INDICATOR								
Students describe how living things are made up of one or more cells and the ways cells help organisms meet their basic needs.	P- 1997 MLR focuses on multicelled separately from single celled		P	Y	C1-3/4 ,C2-PK/2, C2-3/4	P	unclear(2, 3)	1
a. Give examples of organisms that consist of a single cell and organisms that are made of a collection of cells.	Y		Y	Y	C1-3/4	Y	unclear(2, 3)	1

Indicator	Notes				Codes				
b. Compare how needs of living things are met in single-celled and multi-celled organisms.	P- 1997 MLR focuses on multicelled separately from single celled	P	Y		C2-PK/2, C2-3/4		unclear(2, 3)		4
6-8 PERFORMANCE INDICATOR									
Students describe the hierarchy of organization and function in organisms, and the similarities and differences in structure, function, and needs among and within organisms.		P	P		C2-5/8, C3-5/8, C5-5/8	Y		2	2, 4
a. Describe the basic functions of organisms carried out within cells including the extracting of energy from food and the elimination of wastes.		N							
b. Explain the relationship among cells, tissues, organs, and organ systems.		N							
c. Compare the structures, systems and interactions that allow single-celled organisms and multi-celled plants and animals, including humans, to defend themselves, acquire and use energy, self-regulate, reproduce, and coordinate movement.		Y	Y	N	C3-5/8, C5-5/8	Y		2	4
d. Explain that all living things are composed of cells from just one to millions.	Y- The purpose of looking at the slides in 1997 MLR is to develop this idea	Y	N		C2-5/8	Y	unclear		2
9-Diploma PERFORMANCE INDICATOR									
Students describe structure and function of cells at the intracellular and molecular level including differentiation to form systems, interactions between cells and their environment, and the impact of cellular processes and changes on individuals.		P	p	N	C1- 9/D, C2-9/D, C3-9/D, C4-9/D, D4-9/D	y	2, 3, 4		2
a. Describe the similarities and differences in the basic functions of cell membranes and of the specialized parts within cells that allow them to transport materials, capture and release energy, build proteins, dispose of waste, communicate and move.	P- 1997 focuses on relating pats to functions	P	N		C1- 9/D	Y		4	2
b. Describe the relation between DNA, protein molecules and amino acids in carrying out the work of cells and how this is similar among all organisms.	P-2007 adds protiens and amino acids	P	N		C2-9/D	Y	Unclear 2, 3		2

c. Describe the interactions that lead to cell growth and division (mitosis) and allow new cells to carry the same information as the original cell (meiosis).	Y	Y	N	C2-9/D	Y	Unclear 2, 3	2
d. Describe ways in which cells can malfunction and put an organism at risk.	Y- 1997 MLR does not directly connect the ideas related to disease and genetic mutuation to the survival of the organisma	Y	N	C4-9/D, D4-9/D	Y	2	2
e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment.	N						
f. Describe the process of metabolism that allows a few key biomolecules to provide cells with necessary materials to perform their functions.	Y	Y	N	C3-9/D	Y	2	2
g. Describe how cells differentiate to form specialized systems for carrying out life functions.	N						
E4 HEREDITY & REPRODUCTION							
PK-2 PERFORMANCE INDICATOR							
Students describe the cycle of birth, development, and death in different organisms and the ways in which organisms resemble their parents.	P	Y	N	A3-PK/2, D1-PK/2	Y	2	1
a. Give examples of how organisms are like their parents and not like them.	P- 1997 does not specifically mention parents	Y	N	D1-PK/2	Y	2	1
3-5 PERFORMANCE INDICATOR							
Students describe the length and stages of development in humans and other organisms, characteristics of organisms, and the reasons why organisms differ from or are similar to their parents.	Y	Y	Y	D4-3/4	Y	2	2
a. Name some likenesses between children and parents that are inherited, and some that are not.	Y	Y	Y	D4-3/4	Y	2	1
6-8 PERFORMANCE INDICATOR							

Students describe the general characteristics and mechanisms of reproduction and heredity in organisms, including humans, and ways in which organisms are affected by their genetic traits.	P		Y	Y	D4-5/8	Y	4	2
a. Explain that sexual reproduction includes fertilization that results in the inclusion of genetic information from each parent and determines the inherited traits that are a part of every cell.	Y		Y	Y	D4-5/8	Y	4	2
b. Identify some of the risks to the healthy development of an embryo including mother's diet, lifestyle and hygiene.	N							
c. Describe asexual reproduction as a process by which all genetic information comes from one parent and determines the inherited traits that are a part of every cell.	Y		Y	Y	D4-5/8	Y	4	2
9-Diploma PERFORMANCE INDICATOR								
Students examine the role of DNA in transferring traits from generation to generation, in differentiating cells and in evolving new species.	Y		Y	P	C2-9/D, D1-9/D	Y	2	2
a. Explain some of the effects of the sorting and recombination of genes in sexual reproduction.	Y		Y	N	C2-9/D	Y	2	2
b. Describe that genes are segments of DNA that contain instructions for the cells including information that leads to the differentiation of cells and results in varied cell functions in the organism and DNA.	Y-2007 adds greater specificity		Y	N	C2-9/D	Y	2	2
c. Explain the possible causes and effects of gene mutations.	Y		Y	Y	D1-9/D	Y	2	2
E5 EVOLUTION								
PK-2 PERFORMANCE INDICATOR								
Students describe similarities and differences between present day and past organisms that helped them live in their environment.								
a. Describe some organisms' features that allow them to live in places others cannot.	Y		Y	N	D1-PK/2	Y	1	2

b. Explain how some kinds of organisms that once lived on earth have completely disappeared, although they were something like others that are alive today.	P- 1997 focuses on fossils as evidence of past life	P	N		D1-PK/2				
3-5 PERFORMANCE INDICATOR									
present explanations that help us understand	P	P	Y		D1-3/4, D4-3/4	Y	1, 2	2	
some individuals of the same kind being	being similar and different to	P	Y		D4-3/4	Y	2	2	
b. Compare fossils to one another and to living organisms according to their similarities and differences.	P- 1997 limits focus to identification without comparison	P	Y		D1-3/4	Y	1	2	
6-8 PERFORMANCE INDICATOR									
Students describe the evidence that evolution occurs over many generations, allowing species to acquire many of their unique characteristics or adaptations.	P	P	P		C5-9/D, D2-5/8, D3-5/8, D4-5/8, F5-5/8	Y	1, 2, 4	2	
a. Explain how the layers of sedimentary rock and their contained fossils provide evidence for the long history of Earth and for the long history of changing life.	P-2007 adds role that sedimentary rock play in creating the historical record.	Y	Y		D2-5/8, F5-5/8	Y	2, 4	2	
b. Describe how small differences between parents and offspring can lead to descendants who are very different from their ancestors.	Y- 2007 makes connection between natural selection and parent/child genetic transfer	Y	N		D3-5/8, D4-5/8	Y	1, 4	2	
c. Describe how variations in the behavior and traits of an offspring may permit some of them to survive a changing environment.	Y	Y	N		D3-5/8,	Y	1	2	
d. Explain that new varieties of cultivated plants and domestic animals can be developed through genetic modification.	P- 2007 focuses on the explanation of a specific application of genetic engineering, whereas 1997 is much broader	P	N		C5-9/D	Y	4	2	
9-Diploma PERFORMANCE INDICATOR									
Students describe the interactions between species, populations and environments that lead to natural selection and evolution.	P	P	N		D3-9/D, D6-9/D, D7-9/D	Y	2, 4	2	
a. Describe the basic idea of biological evolution, citing evidence from the fossil record and evidence based on the observation of similarities within the diversity of existing organisms.	P- 2007 adds the understanding of diversity of existing organisms to the the fossil evidence	P	N		D7-9/D	Y	2	2	

b. Describe the origins of life and how the concept of natural selection provides a mechanism for evolution that can be advantageous or disadvantageous to the next generation.	P- 2007 combines understanding of origins with natural selection	P	N	D6-9/D	Y		4	2
c. Explain why some organism may have characteristics that have no apparent survival or reproduction advantage.	N							
d. Relate structural and behavioral adaptations of an organism to its survival in the environment.	Y	Y	N	D3-9/D	Y		2	2
Standards,PIs, Descriptors NOT found in 2007 document								
PK/2: B1, B4, B5, C4, E3, H2, J4, K4, K5, M1, M3, M4								
3-4: A3, C3, D2, E1, F1, G3, H2, J6, K1, K2, K5, K6, L1, L2, L3, L6, L7, M1, M2								
6-8: E4, F3, F6, F7, H4, H5, J3, K1, K5, K7, K9, L6, M7, M8								
D: A2, D4, D5, E3, F4, F5, G2, H4, H8, H9, J1, K2, L8, M1, M6								
% increase or decrease # of Standards	13 to 5 for a 62% decrease							
% increase or decrease # of Performance Indicators	about a 70% decrease in number of performance indicators overall							
	Twenty two descriptors in the Dand E of the 2007 MLR are not found in the 1997MLR document.							